

# How Predictive Analytics Maximises Operational Excellence

The integration of manufacturing executions systems (MES) in operation along with real-time business performance management solutions are important to extract and logically implement the enormous data that is generated by the businesses to ensure that the operations adapt to the dynamic conditions of the hydrocarbon industry.

Modern manufacturing is an ecosystem of interconnected software and hardware that helps refineries; chemical and petrochemical companies optimise plants and achieve operational excellence. As businesses generate vast amounts of data, efficient decision support solutions are needed to make sense of vital information and ensure operations can adapt quickly to dynamic conditions.

Today the terms, Industrie 4.0 and the Internet of Things (IoT) are widely discussed across the engineering and manufacturing space, including 'cloud', 'big data'. They all have a place to radically automate manufacturing, but they need to be clearly understood and positioned in context with the manufacturer's operational and commercial objectives.

This article aims to de-mystify buzz-terms that clutter the space and explain how best-practice manufacturing executions systems (MES) integrate the operation, using real-time business performance management to optimally control, analyse, monitor and respond to change immediately across all time horizons. Greater predictability in production outcomes means greater profitability.

## Achieving integration

Intelligent solutions deliver intelligent operational and business outcomes. The IoT is a term often used to describe automated decision support that is an integrated communications landscape, enabling manufacturers to take predictive decisions based upon models that achieve faster operational efficiencies and deliver greater productivity. Bridging the gap between plant operations and commercial transactions using the latest digital innovations will optimise decision support at the plant floor level through to the executive boardroom.

A recently published ARC Insights report highlighted, "The potential of the Industrial Internet of Things (IIoT) to transform production operations is one of the hottest current topics in manufacturing. Along with related initiatives, such as Industrie 4.0, IT/OT convergence, and Smart Manufacturing, the IIoT is cited as an approach to make manufacturing production more flexible, cost effective, and responsive to changes in customer demand."

The term industrie 4.0, often described as the fourth industrial revolution, is a collective term embracing a number of contemporary automation, data

exchange and manufacturing technologies. Not only are manufacturers besieged with a plethora of industry terms, but also vast volumes of information generated from various sources, including diverse automation systems, such as DCS, PLCs, MES, CPM, ERP, WMS, PIMS, DMS, LIMS, QMS, batch management systems and historians. The capture and collection of data is a major issue for manufacturers because they can be accumulated into disparate forms ranging from spreadsheets and reports to numerous custom applications and systems. Without effective visualisation and analysis tools, employees face evaluating hundreds of static spreadsheets or reports rather than making business-critical decisions based on timely information. However, modern analytics are delivering new capabilities that enable deeper and richer analyses. From monitoring processes to dealing with process upsets, operators, engineers and subject matter experts can gain speedy access to vital information to keep production running smoothly.

## Addressing root causes

If staff have a myopic view of plant behaviour then it is difficult for them to respond quickly to operational issues. Hence, reducing the time spent investigating root causes of plant problems releases operators to spend more time analysing data to make more informed decisions about plant performance. The intelligence gathered from such analyses opens up opportunities to optimise the operation and maximise profitability at key production stages. Manufacturers adopting best practices typically manage their operations utilising real-time data and can distribute, visualise and analyse information intelligently to operate plants profitably. Manufacturing execution systems (MES) fulfil this need, enabling process manufacturers to quickly identify manufacturing performance problems, assess root causes and take corrective actions.

A recent report on Market Guide for Manufacturing Execution System Software by Gartner highlighted "There will increasingly be more pressure on the MES vendor community to provide tools for analyzing massive amounts of data, as well as to provide predictive technologies for helping manufacturers make better decisions based on the data they are capturing."

The latest software technology creates an ideal environment to enable companies to optimise each of the key areas of the production process, whilst interacting dynamically to meet commercial and operational

goals. Many companies have adopted integrated MES software platforms to become proficient faster, bringing the power of optimisation to more people in engineering, operations, planning and scheduling across the enterprise. As a result, manufacturers are better able to increase capacity, improve margins, reduce costs and become more energy-efficient.

The integrated suite of tools helps stakeholders to collaborate and look across an organisation to make the necessary decisions to respond, take corrective actions in real-time and execute in synchronisation with the overall integrated plan. In addition, the software allows decision-makers to perform such actions either in-plant or via HTML-5 technology enabled mobile devices. Essentially, HTML-5 is a mark-up language used for structuring and presenting content on the Internet and supports the latest multimedia platforms, while making it easily readable by users with current web browsers on compatible computers and devices. Crucially, the power of software applications equips staff with easy-to-use tools that present data in context and in an easy-to-understand manner.

Data analytics software automatically identifies and adjusts manufacturing production processes whilst monitoring for discrepancies in model fidelity and helps operators improve efficiency. Many leading companies have adopted AspenTech's aspenONE MES software solutions to increase profitability, reduce variability and improve overall asset utilisation. The data management capabilities within aspenONE MES collect and organise process data across disparate systems and distribute it across the enterprise to make it easy to optimise data value.

The aspenONE MES data foundation collects and stores large volumes of real-time and historical data from process control, manufacturing operations, laboratory systems. Additionally, connecting production data with business systems forms the foundation for an enterprise-level analysis and decision support platform. Rich calculations, analytic and visualisation tools unlock the data's value, allowing operators to compare performance across a range of assets and disseminate best practices to processes and sites that require improvement.

aspenONE Process Explorer is the intelligent solution to access, visualise, analyse and monitor plant operations data. It provides secure access from any device connected to the network without the need for client-side add-ins or software installation. With aspenONE Process Explorer users can choose between desktop, laptop, tablets and smartphones, so they are always in touch with their production data, anytime and anywhere. More companies are embracing web-based technology because of its zero install footprint, multi-platform support that comes with HTML-5 and intuitive user interface.

### **Predictive analytics optimises profitability**

In today's technological landscape of 4.0 and IoT, advanced tools

dramatically improve predictive analytics based upon models that support faster and better decisions to optimally plan, schedule, control, and execute products to the highest standard. MES provides the tools that enable companies to reduce variability and improve asset effectiveness.

Smart manufacturing is a system of integrated modern technology and process methodology that makes production more efficient, adaptable, cost-effective and responsive to changes in economic conditions. Establishing a centre of operational excellence also improves communications and brings planning, scheduling and operational execution closer together. Those refineries, chemical and petrochemical companies that adopt best practices and use cohesive MES software tools can achieve a fully-integrated operation. With improved data analytics, key stakeholders can add immediate value and make more informed decisions quicker to drive increased productivity.

The process world is rapidly becoming more competitive. The key driver for forward-thinking manufacturers is to empower stakeholders with specialist MES tools to enable them to achieve operational excellence. The payback can be seen within six months and with greater predictability comes greater profits. ●



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